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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TAKAHISA KURAHASHI, HIROYUKI HOSOBA,
HIROSHI NAKATSU, TETSUROU MURAKAMI,
and SHOUICHI OHYAMA

Appeal 2008-2476
Application 09/778,045
Technology Center 1700

Decided: August 12, 2008

Before CHARLES F. WARREN, TERRY J. OWENS, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

The Appellants appeal from a rejection of claims 1-8, 15-22, 25, and 26. Claims 23 and 24, which are all of the other pending claims, stand allowable.

THE INVENTION

The Appellants claim a semiconductor light emitting device. Claim 1 is illustrative:

1. A semiconductor light-emitting device comprising:

a DBR (Distributed Bragg Reflector) and a light-emitting layer supported by at least a substrate comprising GaAs, the DBR being located between the substrate comprising GaAs and the light-emitting layer, wherein light directed from the light-emitting layer toward a top surface of the light-emitting device has a radiation angle dependence;

a semiconductor layer formed over at least the light-emitting layer, a top surface of the semiconductor layer comprising a roughened surface which is not at least partially covered by the other semiconductor layers in order to cause light output from the light-emitting device to be diffused upon leaving the top surface of the device; and

wherein no DBR is provided between the light-emitting layer and the semiconductor layer having the top surface that is roughened.

THE REFERENCES

Vakhshoori	US 5,426,657	Jun. 20, 1995
Krames	US 5,779,924	Jul. 14, 1998
Saeki	US 6,350,997 B1	Feb. 26, 2002 (filed Apr. 21, 1999)

THE REJECTION

Claims 1-8, 15-22, 25, and 26 stand rejected under 35 U.S.C. § 103 over Krames in view of Saeki and Vakhshoori.

OPINION

We affirm the Examiner's rejection.

The Appellants argue claims 1, 8, 15, 21, 22, 25, and 26 (Br. 9-21). We therefore limit our discussion to those claims. Claims 2-7 stand or fall

with claim 1 from which they directly or indirectly depend, and claims 16-20 stand or fall with claim 15 from which they directly or indirectly depend. *See* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

Claims 1 and 15

Saeki discloses a semiconductor light emitting element comprising a GaAs substrate (11), a light emitting active layer (26), a Bragg multi-layered reflector (24) between the substrate and the active layer, and a p-type semiconductor contact layer (22) that has a roughened top surface and is formed over the light emitting layer (col. 5, ll. 13, 15-18; col. 9, ll. 2-13, 58-63; Fig. 8B). The Appellants indicate that light reflected from a Bragg reflector inherently has a radiation angle dependence (Spec. 2:11-17). In Saeki's Figure 8B there is no Bragg reflection layer between light emitting active layer 26 and semiconductor contact layer 22 having the roughened top surface.

The Appellants argue (Br. 12, 17):

> The device of Saeki is designed to reduce the operation voltage and increase optical output. To achieve this, a contact layer (22) doped with carbon for reducing the contact resistance with ITO electrode (16) is provided and an intermediate band gap layer (21) is interposed between the contact layer (22) and the cladding layer (15) for alleviating band discontinuity, thereby promoting inflow of holes and decreasing resistance. Consequently, the need is met by the use of such layers and there would have been no need to further enhance light emission by texturing the top surface of the device.

The portion of Saeki relied upon by the Appellants in that argument is column 1, lines 7-14 and column 6, lines 25-49. The Appellants have not provided evidence that the conclusion stated in the third sentence follows from the facts set forth in the first two sentences. The conclusion is mere

attorney argument, and such argument of counsel cannot take the place of evidence. *See In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984). Regardless, as pointed out above, Saeki discloses, over the light emitting active layer, a semiconductor layer (22) having a roughened top surface (col. 5, ll. 15-18; col. 9, ll. 58-63; Fig. 8B).

Accordingly, we find that Saeki anticipates the invention claimed in the Appellants' claims 1 and 15. Anticipation is the epitome of obviousness. *See In re Skoner*, 517 F.2d 947, 950 (CCPA 1975); *In re Pearson*, 494 F.2d 1399, 1402 (CCPA 1974).

Krames discloses a semiconductor light emitting device comprising a substrate (3) having thereon semiconductor epitaxial layers (1) containing a p-n junction active region (2), wherein the top epitaxial layer has an ordered textured surface (7) (col. 6, l. 66 – col. 7, l. 32).

The Examiner argues that "[i]t would have been obvious to include a lower optical reflection layer, such as layer 24 in the Saeki device, below the light emitting layer of the Krames device, in order to re-direct the downward emitted light upward, so it won't be wasted" (Ans. 6).

The Appellants argue that Krames' ordered textured surface does not diffuse light (Br. 13, 17-18).

Krames' ordered textures diffuse light in transmission modes t_1, t_2 and t_3 as shown in Figure 3 (col. 4, ll. 5-15).

The Appellants direct arguments toward Krames' resonance cavity embodiment (col. 6, ll. 6-24; col. 9, ll. 5-14; Fig. 13) (Br. 12-14, 16-18).

Those arguments are unpersuasive as not pertaining to Krames' more relevant embodiment discussed above.

For the above reasons we are not persuaded of reversible error in the rejection of claim 1, claims 2-7 that stand or fall therewith, claim 15 and claims 16-20 that stand or fall therewith.[1]

Claims 8, 21, and 22

Claim 8 requires that "the layer whose surface is a roughened surface has a lattice constant different by 0.5% or more from that of the GaAs substrate." Claims 21 and 22 require that "the semiconductor with roughened surface has a lattice constant different by 0.5% or more than that of the substrate comprising GaAs."

The Appellants argue that "[t]here is absolutely nothing in the cited art which discloses or suggests this claimed range" (Br. 15, 19).

Krames discloses a GaP layer having an ordered textured surface (col. 3, ll. 57-61). The Examiner finds that "GaP has a lattice constant of 5.450, which is 3.6% different from that of GaAs (5.653)" (Ans. 9). Since the Examiner's finding is reasonable and the Appellants have not challenged it, we accept it as fact. *See In re Kunzmann*, 326 F.2d 424, 425 n.3 (CCPA 1964). Hence, the Appellants' argument is not well taken.

The Appellants argue that "[t]he instant specification establishes unexpected results and criticality as to this range, and explains that this lattice constant difference of 0.5% or more is highly advantageous in that it allows for example the wafer surface to be roughened by a sequence of crystal growth due to the lattice constant difference thereby permitting a step of separately roughening the surface after crystal growth to be eliminated (e.g., pg. 8, lines 3-10; pg. 11, lines 5-18)" (Br. 14-15, 19).

[1] A discussion of Vakhshoori is not necessary to our decision.

The Appellants' argument is not persuasive because the Appellants have not provided a side-by-side comparison of the claimed invention with the closest prior art which is commensurate in scope with the claims, and explained why the results would have been unexpected by one of ordinary skill in the art. *See In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991); *In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984); *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983); *In re Clemens*, 622 F.2d 1029, 1035 (CCPA 1980); *In re Freeman*, 474 F.2d 1318, 1324 (CCPA 1973); *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972).

Hence, we are not persuaded of reversible error in the rejection of claims 8, 21, and 22.

Claims 25 and 26

Claims 25 and 26 require that "no mirror is provided between the light-emitting layer and the semiconductor layer having the top surface that is roughened."

Saeki does not disclose a mirror or reflector between the light emitting layer and the semiconductor layer having a roughened top surface, and such a mirror is not disclosed in Krames' above-discussed embodiment.

The Appellants direct their argument regarding claims 25 and 26 toward Krames' resonance cavity embodiment (col. 6, ll. 6-24; col. 9, ll. 5-14; Fig. 13) (Br. 12-14, 16-18).

Those arguments are unpersuasive as not directed toward Krames' more relevant embodiment discussed above.

We therefore are not convinced of reversible error in the rejection of claims 25 and 26.

DECISION

The rejection of claims 1-8, 15-22, 25, and 26 under 35 U.S.C. § 103 over Krames in view of Saeki and Vakhshoori is affirmed.

AFFIRMED

PL initials:
sld

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